ORLEANS WASTEWATER MANAGEMENT **May 23, 2025**
Mill Pond Nitrogen Management Evaluation

Mill Pond in Nauset Estuary suffers from seasonal anoxic conditions and degraded habitat. The purpose of this Scope of Work is to determine short-term actions to improve water quality, knowing actions identified in the Town's Amended CWMP are many years away. Mill Pond sewers are currently scheduled for Phase 11 of the Town's 16-phase sewer program. A series of tasks below will evaluate alternatives that can be implemented in the short-term and later integrated into the Town's long-term wastewater management strategy. The intent of this scope of work is to identify projects that are likely, based on available information, to be feasible and to most cost-effectively yield faster water quality improvements in Mill Pond.

Study Area

The study area consists of the Mill Pond and upper Mill Pond, from the historic "mill race" to the terminus of the upper pond.

Preliminary Scope of Work

1. Summarize estimates of nitrogen load to Mill Pond, including watershed, atmospheric and benthic loads. Start with the 2012 MEP report and estimate the growth in watershed load since the 2001 - 2004 basis for that MEP report.
2. Estimate water consumption for all developed parcels in the Mill Pond watershed, including both public water supply and private wells.
3. Summarize available information related to water quality and habitat impairment in Mill Pond. Establish a range of watershed nitrogen removals to form the basis for this study.
4. Evaluate potentially feasible options for reducing nitrogen loads to Mill Pond. Options include at least the following:
    - Extension of the public sewer system and conveyance of collected wastewater to the existing municipal WWTF;
    - Permeable reactive barriers;
    - A local wastewater collection system leading to a municipal satellite WWTF near Mill Pond;
    - Shellfish aquaculture;
    - Individual on-site denitrifying septic systems;
    - Dredging or flushing to remove benthic deposits;
    - Stormwater management; and
    - Oxygen Saturation Technology
    - Emerging technologies (such as urine diversion toilets)

    Evaluation will include a desktop study to identify potential sites for the identified options as well as ability to remove nitrogen. Other criteria may also be utilized to identify the two or three most favorable options.

5. Prepare a conceptual design of the short-listed options to serve as basis for further review.
6. Prepare preliminary cost estimates for the shortlisted options, including capital costs, operation and maintenance costs, and replacement costs. Identify the components of each option that are not likely to be eligible for state grants and low-interest loans. Distill the cost estimates to present worth and estimate the all-in cost per pound of nitrogen removed.
7. Summarize anticipated environmental impacts that are associated with each shortlisted alternative.
8. Coordinate with MassDEP and CCC on matters related to watershed permitting, funding eligibility, etc.
9. Recommend an approach for water quality improvement at Mill Pond that can be implemented ahead of the scheduled ACWMP improvements. , present its costs and environmental impacts/benefits and develop an implementation schedule.
10. Meet four times with the WMAC during the study. Assume that WMAC meetings will provide appropriate opportunities for public input.
11. Document the process described above and associated recommendations in a focused written report with appropriate tables and figures. Submit the draft report to the WMAC and MFWQC, receive and address comments, and issue a final report.

Items not included:

- Water quality sampling and analysis
- Field topographic and property-line surveys
- Field identification of natural resources
- Sub-surface soils explorations
- Archaeological and historical surveys
- Permitting

Schedule. Assuming authorization to proceed by July 1, 2025, submit a draft report to the WMAC by November 1, 2025. Assuming timely comments from the WMAC, complete the final report by December 31, 2025.